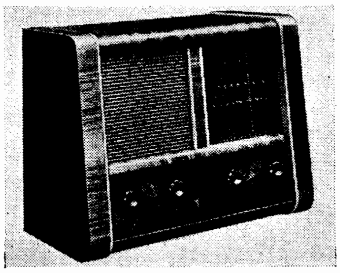
Supplement to The Wireless & Electrical Trader, August 7, 1948

"TRADER" SERVICE SHEET

872

ALBA D311

Band-Spread Superhet



SIX BAND-SPREAD S.W. bands are provided on the Alba D311 in addition to the normal S.W., M.W. and L.W. bands and gram, selection being effected by a 10-position rotary control.

The receiver is a 4-valve (plus rectifier) A.C. superhet designed for mains of 100-250 V, 40-100 c/s. The band-spread ranges are: 11, 13, 16, 19, 25 and 31 m, and the remaining ranges are 35-100 m, 200-550 m, and 800-2,000 m.

The D411 console is similar in every respect to the D311, but it is fitted in a console cabinet and provided with a 10in speaker.

Release date, both models, December 1947.

Original prices: D311, £23 2s; D411, £35 14s, plus purchase tax.

CIRCUIT DESCRIPTION

For band-spread operation on the 11, 13, 16, 19, 25 and 31 metre bands the aerial is inductively coupled to single-tuned circuits **L2, L4, L6, L8, L10** and **L12** respectively, tuned by a small capacitance section **C34** of the gang. On S.W., M.W. and L.W. bands the aerial is inductively coupled to single-tuned circuits **L16, L17** and **L18** respectively, tuned by **C34** and the large capacitance section **C33** of the gang, in parallel.

First valve **(V1, Mullard metallized ECH35)** is a triode-hexode operating as frequency changer with internal coupling. Triode oscillator band-spread grid coils **L19, L21, L23, L25, L27** and **L29** are tuned by the small capacitance section **C35** of the gang, with inductive reaction coupling from anode by coils **L20, L22, L24, L26, L28** and **L30.**

Oscillator grid coils **L31** (S.W.), **L32** (M.W.) and **L33** (L.W.) are tuned by **C35** in parallel with the large capacitance section **C36** of the gang, with parallel trimming by **C37** (S.W.), **C38** (M.W.), **C39** (L.W.) and series tracking by **C9** (S.W.), **C10** (M.W.) and **C11** (L.W.). Reaction coupling by anode coils **L34** (S.W.), **L35** (M.W.) and **L36** (L.W.), with additional coupling on S.W. and L.W. due to the common impedance of the trackers in grid and anode circuits.

Second valve **(V2, Mullard metallized EF39)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings.

Intermediate frequency 455 kc/s.

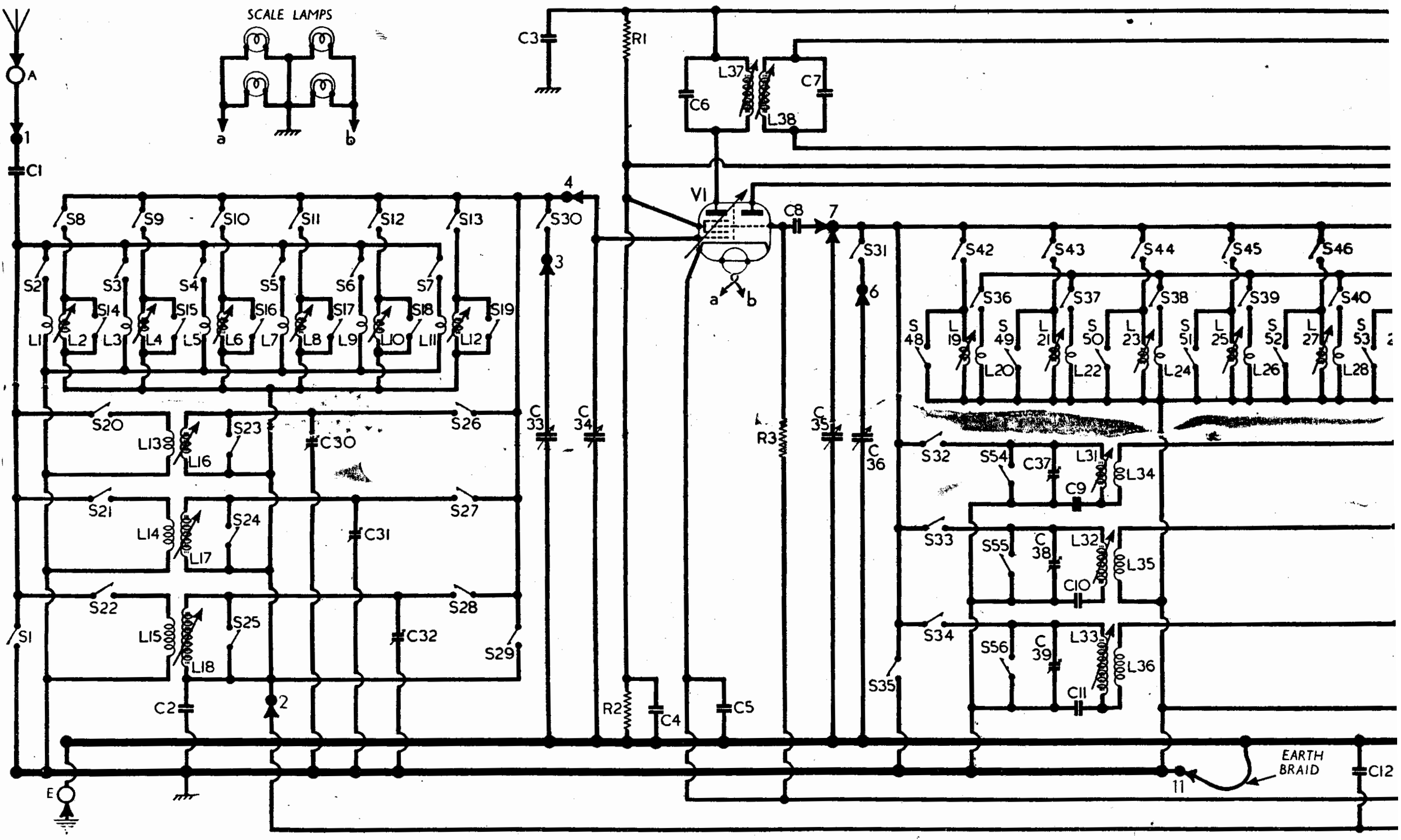
Diode second detector is part of double diode-triode valve **(V3, Mullard metallized EBC33).** Audio frequency component in rectified output is developed across load resistor **R8** and passed via **C18, S61** and manual volume control **R9,** to grid of triode section, which operates as A.F. amplifier.

Second diode of **V3,** fed from **L40** via **C20,** provides D.C. potentials which are developed across load resistor **R13** and fed back as G.B. to F.C. and I.F. valves, giving A.V.C.

Resistance-capacitance coupling by **R11, C24** and **R14,** via grid stopper **R15,** between **V3** triode and pentode output valve **(V4, Mullard EL33).**

COMPONENTS AND VALUES

RESISTORS		Values (ohms)	Locations
R1	V1, V2, S.G.'s H.T. potential divider	22,000	I5
R2		33,000	H5
R3	V1 osc. C.G. ...	47,000	H4
R4	A.V.C. decoupling	250,000	H5
R5	Osc. H.T. feed ...	27,000	H5
R6	React. stabilizer ...	100	K11
R7	I.F. stopper ...	47,000	C2
R8	Sig. diode load ...	470,000	C2
R9	Volume control ...	1,000,000	F3
R10	V1, V2, V3 fixed G.B.	150	H5
R11	V3 triode load ...	47,000	F5
R12	A.V.C. decoupling	1,000,000	G5
R13	A.V.C. diode load	1,000,000	G5
R14	V4 C.G. resistor ...	560,000	F5
R15	V4 C.G. stopper ...	47,000	E5
R16	V4 G.B. resistor ...	150	F5
R17	Tone control ...	50,000	E3
R18	H.T. smoothing resistors	1,000	E5
R19		2,200	I5



Circuit diagram of the Alba D311 and D411 A.C. superhets. The six band-spread tuning circuits are arranged in a horizontal row abov
circuits, the band-spread ranges are: 11 m, 13 m, 16 m, 19 m, 25 m and 31 m. All nine sets of coils are housed in the tuning assembly,
and arrows numbered 1 to 11. The tags concerned are similarly numbered in our illustration of the assembly in col. 4 ove

CAPACITORS		Values (μF)	Locations
C1	Aerial series ...	0·0002	J8
C2	V1 hex. C.G. decoup	0·005	J9
C3	H.T. R.F. by-pass	0·1	H5
C4	S.G.'s decoup. ...	0·1	I5
C5	V1 cath. by-pass...	0·1	H5
C6	1st I.F. transformer tuning	0·0001	B2
C7		0·0001	B2
C8	V1 osc. C.G. ...	0·0001	I4
C9	Osc. S.W. track ...	0·0025	J11
C10	Osc. M.W. track ...	0·000575	K11
C11	Osc. L.W. track ...	0·0002	J12
C12	A.V.C. decoupling	0·05	H5
C13	Osc. anode coup ...	0·0001	I4
C14	2nd I. F. transformer tuning ...	0·0001	C2
C15		0·0001	C2
C16	I.F. by-passes ...	0·0001	C2
C17		0·0001	C2
C18	A.F. coupling ...	0·005	F5
C19	H.T. R.F. by-pass	0·1	H4
C20	A.V.C. coupling ...	0·0002	F5
C21	Cathode by-pass ...	0·5	G4
C22	A.V.C. decoup ...	0·05	G5
C23	I.F. by-pass ...	0·0002	F5
C24	A.F. coupling ...	0·01	F5
C25	Tone corrector ...	0·005	F5
C26	Part tone control	0·05	F5
C27*	H.T. smoothing capacitors... ...	8·0	E4
C28*		16·0	F4
C29*		16·0	F4
C30‡	Aerial S.W. trim....	0·00008	J8
C31‡	Aerial M.W. trim.	0·00008	J8
C32‡	Aerial L.W. trim.	0·00008	J7
C33†	Aerial tuning ...	0·0005	A1
C34†		0·000017	A1
C35†	Oscillator tuning	0·000017	A2
C36†		0·0005	A2
C37‡	Osc. S.W. trim. ...	0·00008	J10
C38‡	Osc. M.W. trim. ...	0·00008	J11
C39‡	Osc. L.W. trim. ...	0·00008	J11

*Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	Aerial 11 m coup....	Very low	J8
L2	Aerial 11 m tune ...	Very low	J8
L3	Aerial 13 m coup....	Very low	K8
L4	Aerial 13 m tune ...	Very low	K8
L5	Aerial 16 m coup ...	Very low	K8
L6	Aerial 16 m tune ...	Very low	K8
L7	Aerial 19 m coup....	Very low	K8
L8	Aerial 19 m tune ...	Very low	K8
L9	Aerial 25 m coup....	Very low	K8
L10	Aerial 25 m tune ...	Very low	K8
L11	Aerial 31 m coup....	Very low	J8
L12	Aerial 31 m tune ...	0·3	J8
L13	Aerial S.W. coup....	0·4	J7
L14	Aerial M.W. coup.	1·7	K7
L15	Aerial L.W. coup.	66·0	K7
L16	Aerial S.W. tune ...	0·3	J7
L17	Aerial M.W. tune...	4·5	K7
L18	Aerial L.W. tune ...	24·0	K7
L19	Osc. 11 m tune ...	Very low	J10
L20	Osc. 11 m react. ...	Very low	J10
L21	Osc. 13 m tune ...	Very low	K10
L22	Osc. 13 m react. ...	Very low	K10
L23	Osc. 16 m tune ...	Very low	K10
L24	Osc. 16 m react. ...	Very low	K10
L25	Osc. 19 m tune ...	Very low	K11
L26	Osc. 19 m react. ...	Very low	K11
L27	Osc. 25 m tune ...	Very low	K11
L28	Osc. 25 m react. ...	Very low	K11
L29	Osc. 31 m tune ...	0·3	J11
L30	Osc. 31 m react. ...	Very low	J11
L31	Osc. S.W. tune ...	0·4	J11
L32	Osc. M.W. tune ...	3·25	K11
L33	Osc. L.W. tune ...	13·0	K11
L34	Osc. S.W. react. ...	0·3	J11
L35	Osc. M.W. react. ...	2·0	K11
L36	Osc. L.W. react. ...	4·5	K11
L37	1st I.F. trans. Pri. ...	10·0	B2
L38	Sec. ...	10·0	B2
L39	2nd I.F. trans. Pri. ...	8·0	C2
L40	Sec. ...	8·0	C2

(*Continued next col.*)

OTHER COMPONENTS (*continued*)		Approx. Values (ohms)	Locations.
L41	Speech coil ...	2·25	D1
T1	Speaker trans. Pri. ...	430·0	D1
	Sec. ...	0·25	D1
T2	Mains trans. Pri., total	25·0	B1
	Heat. sec.	0·1	B1
	Rect. heat sec. ...	Very low	B1
	H.T. sec., total ...	470·0	B1
S1-S62	W/band and P.U. switches ...	—	—
S63	Mains sw., g'd R17	—	E3

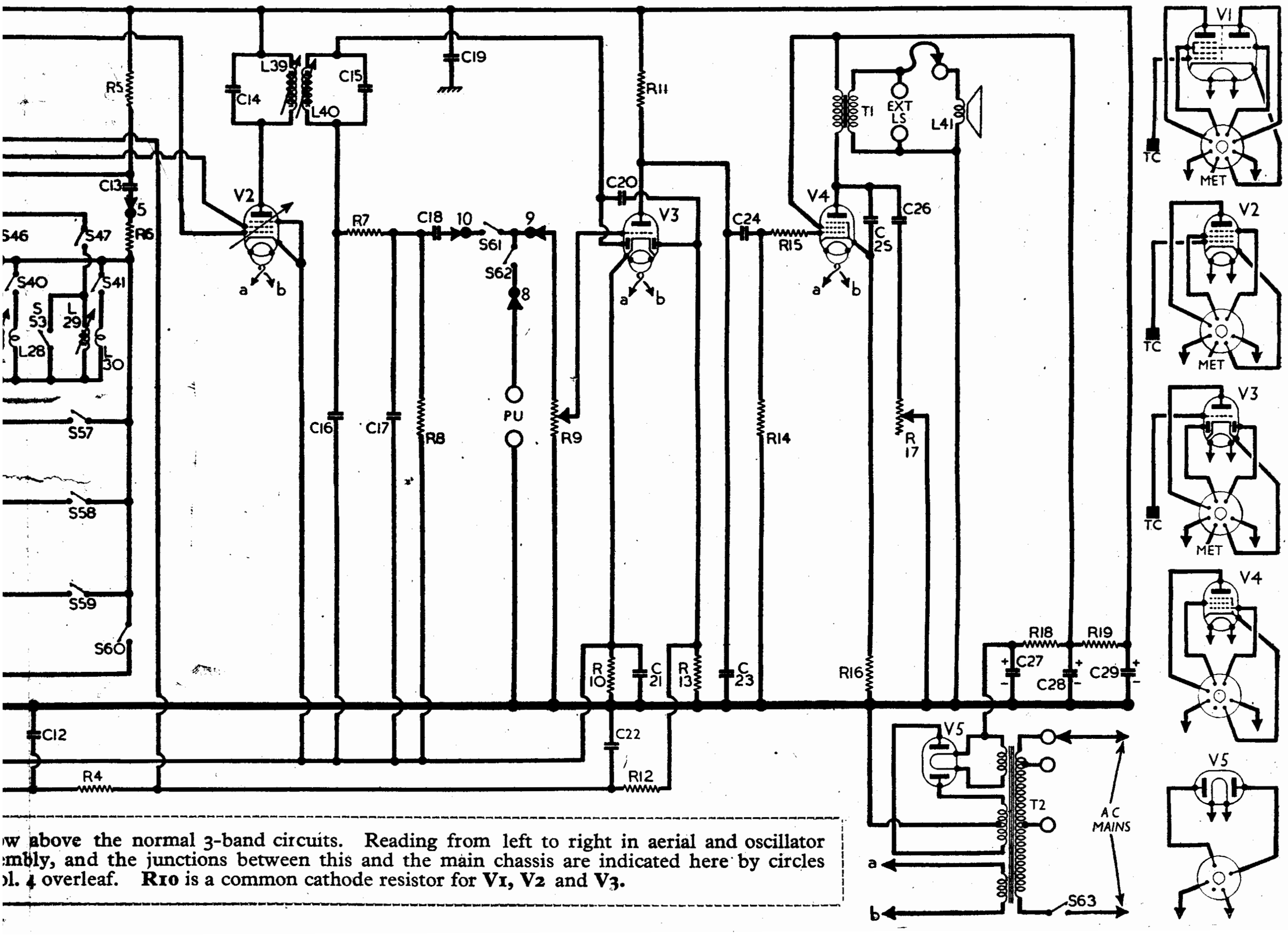
VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating from mains of 232 V, using the 230 V tapping on the mains transformer.

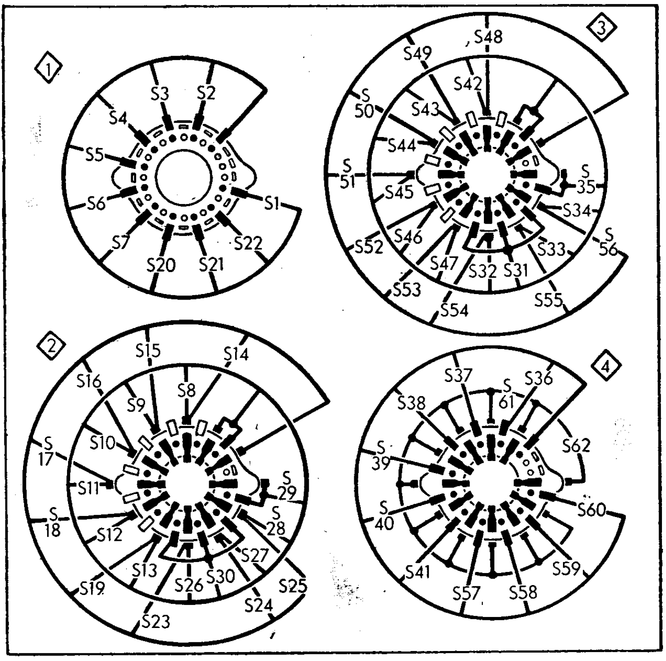
Voltages were measured on the 400 V scale of a model 7 Avometer, chassis being the negative connection.

Valve		Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1	ECH35	204	2·0	89	2·0
		Oscillator			
		97	4·5		
V2	EF39	204	4·5	89	1·3
V3	EBC33	113	1·8	—	—
V4	EL33	232	31·0	247	3·8
V5	AZ31	296†	—	—	—

† Each anode, A.C.



w above the normal 3-band circuits. Reading from left to right in aerial and oscillator mbly, and the junctions between this and the main chassis are indicated here by circles l. 4 overleaf. **R10** is a common cathode resistor for **V1, V2** and **V3.**



Above: Diagrams of the four waveband switch units, all viewed in the direction of the arrows in the tuning assembly illustration in col. 4.

Right: The associated switch table, giving the switch positions for the ten control settings.

Switch	11m	13m	16m	19m	25m	31m	S.W.	M.W.	L.W.	Gram
S1	—	—	—	—	—	—	—	—	—	C
S2	C	—	—	—	—	—	—	—	—	—
S3	—	C	—	—	—	—	—	—	—	—
S4	—	—	C	—	—	—	—	—	—	—
S5	—	—	—	C	—	—	—	—	—	—
S6	—	—	—	—	C	—	—	—	—	—
S7	—	—	—	—	—	C	—	—	—	—
S8	C	—	—	—	—	—	—	—	—	—
S9	—	C	—	—	—	—	—	—	—	—
S10	—	—	C	—	—	—	—	—	—	—
S11	—	—	—	C	—	—	—	—	—	—
S12	—	—	—	—	C	—	—	—	—	—
S13	—	—	—	—	—	C	—	—	—	—
S14	—	C	C	C	C	C	C	C	C	C
S15	C	—	C	C	C	C	C	C	C	C
S16	C	C	—	C	C	C	C	C	C	C
S17	C	C	C	—	C	C	C	C	C	C
S18	C	C	C	C	—	C	C	C	C	C
S19	C	C	C	C	C	—	C	C	C	C
S20	—	—	—	—	—	—	C	—	—	—
S21	—	—	—	—	—	—	—	C	—	—
S22	—	—	—	—	—	—	—	—	C	—
S23	C	C	C	C	C	C	—	C	C	C
S24	C	C	C	C	C	C	C	—	C	C
S25	C	C	C	C	C	C	C	C	—	C
S26	—	—	—	—	—	—	C	—	—	—
S27	—	—	—	—	—	—	—	C	—	—
S28	—	—	—	—	—	—	—	—	C	—
S29	—	—	—	—	—	—	—	—	—	C
S30	—	—	—	—	—	—	C	C	C	—
S31	—	—	—	—	—	—	C	C	C	—
S32	—	—	—	—	—	—	C	—	—	—
S33	—	—	—	—	—	—	—	C	—	—
S34	—	—	—	—	—	—	—	—	C	—
S35	—	—	—	—	—	—	—	—	—	C
S36	C	—	—	—	—	—	—	—	—	—
S37	—	C	—	—	—	—	—	—	—	—
S38	—	—	C	—	—	—	—	—	—	—
S39	—	—	—	C	—	—	—	—	—	—
S40	—	—	—	—	C	—	—	—	—	—
S41	—	—	—	—	—	C	—	—	—	—
S42	C	—	—	—	—	—	—	—	—	—
S43	—	C	—	—	—	—	—	—	—	—
S44	—	—	C	—	—	—	—	—	—	—
S45	—	—	—	C	—	—	—	—	—	—
S46	—	—	—	—	C	—	—	—	—	—
S47	—	—	—	—	—	C	—	—	—	—
S48	—	C	C	C	C	C	C	C	C	C
S49	C	—	C	C	C	C	C	C	C	C
S50	C	C	—	C	C	C	C	C	C	C
S51	C	C	C	—	C	C	C	C	C	C
S52	C	C	C	C		C	C	C	C	C
S53	C	C	C	C			C	C	C	C
S54	C	C	C	C	C	C	—	C	C	C
S55	C	C	C	C	C	C	C	—	C	C
S56	C	C	C	C	C	C	C	C	—	C
S57	—	—	—	—	—	—	C	—	—	—
S58	—	—	—	—	—	—	—	C	—	—
S59	—	—	—	—	—	—	—	—	C	—
S60	—	—	—	—	—	—	—	—	—	C
S61	C	C	C	C	C	C	C	C	C	—
S62	—	—	—	—	—	—	—	—	—	C

CIRCUIT ALIGNMENT

I.F. Stages.—Connect signal generator, via an 0.1 μF capacitor in the "live" lead, to control grid (top cap) of **V1** and the **E** socket, leaving the existing top cap connector in position, and short-circuit **C36** (location reference A2). Switch set to M.W., turn gang capacitor and volume control to maximum, feed in a 455 kc/s (659.3 m) signal, and adjust the cores of **L40, L39, L38** and **L37** (C2, B2) for maximum output. Repeat these adjustments and finally remove the short-circuit from **C36**.

R.F. and Oscillator Stages.—With the gang at maximum capacitance the cursor should be vertical and coincident with the high wavelength ends of the scales. It may be adjusted in position by sliding it along the drive cord. Transfer "live" signal generator lead, via a suitable dummy aerial, to **A** socket.

M.W.—Switch set to M.W., tune to 500 m on scale, feed in a 500 m (600 kc/s) signal, and adjust the cores of **L32** (I6) and **L17** (I3) for maximum output. Tune to 250 m on scale, feed in a 250 m (1,200 kc/s) signal, and adjust **C38** (I5) and **C31** (I4) for maximum output. Repeat these adjustments until no improvement results, and then check calibration at 350 m (857 kc/s).

L.W.—Switch set to L.W., tune to 1,900 m on scale, feed in a 1,900 m (157.9 kc/s) signal, and adjust the cores of **L33** (I6) and **L18** (I3) for maximum output. Tune to 1,000 m on the scale, feed in a 1,000 m (300 kc/s) signal, and adjust **C39** (I6) and **C32** (I3) for maximum output. Repeat these adjustments until no improvement results, and then check calibration at 1,500 m (200 kc/s).

S.W.—Switch set to S.W., tune to 100 m on scale, feed in a 100 m (3 Mc/s) signal, and adjust the cores of **L31** (I6) and **L16** (I3) for maximum output. Tune to 50 m on scale, feed in a 50 m (6 Mc/s) signal, and adjust **C37** (I5) and **C30** (I4) for maximum output. Repeat these operations until no improvement results.

Band-spread S.W. Bands.—Access may be gained to the core adjustments involved without removing the chassis, if the small plywood cover (two countersunk-head wood screws) is removed from the bottom of the cabinet. It should be noted that unless a crystal-controlled signal generator is used the receiver calibration is likely to be only approximately correct, and should finally be compared with the wavelengths of known S.W. broadcast stations.

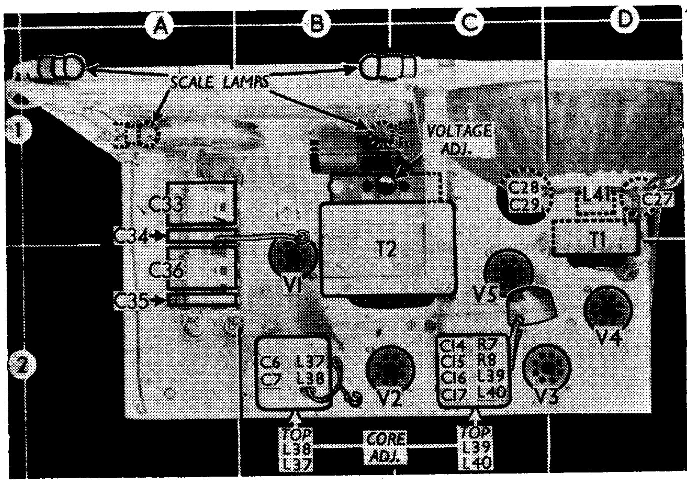
It is essential to select the fundamental signal, and not its image, for alignment purposes. This point can be easily checked, since it should be possible to inject and tune in a signal at the high frequency end of each band and receive its image at a lower frequency on the same band if the alignment has been carried out correctly. Also, the image of a low frequency signal fed in on any band should fall outside the tuning range of the band concerned, and therefore it should be possible to receive the fundamental signal only.

Commence the alignment of each band by unscrewing the appropriate coil cores until they project slightly from the assembly. All cores should be adjusted for maximum signal, and where two peaks are found the outermost (anticlockwise) one should be used.

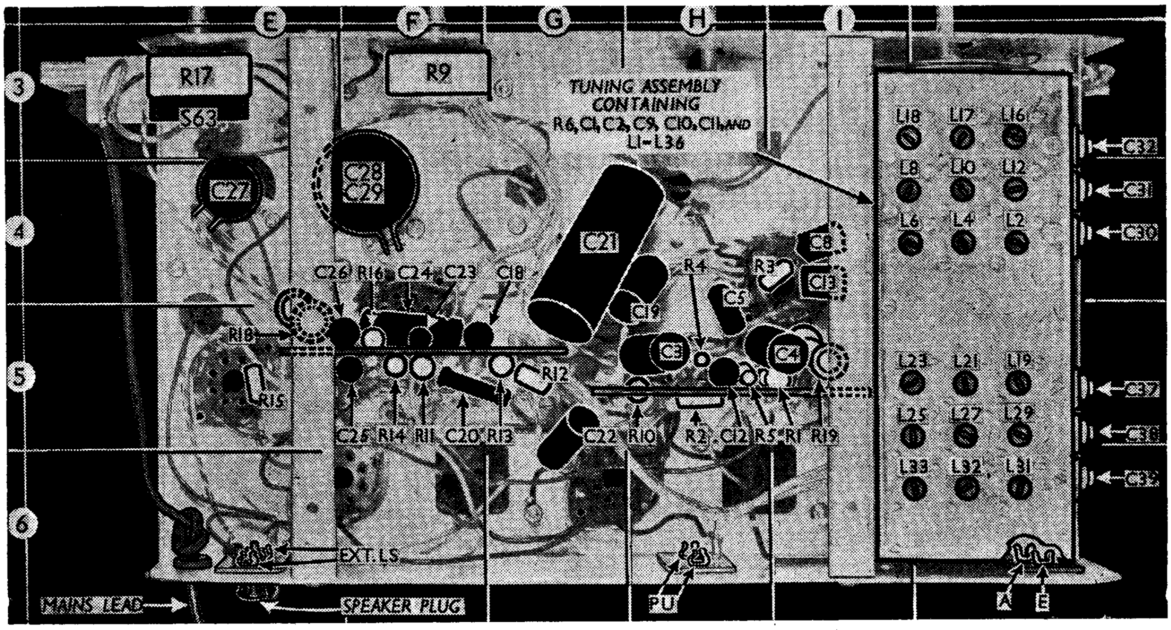
11 m Band.—Switch set to 11 m, tune to 26.6 Mc/s on scale, feed in a 26.6 Mc/s signal, and adjust cores of **L19** (I5) and **L2** (I4). Tune to 25.7 Mc/s on scale, check that image signal is present, and finally feed in a 25 Mc/s signal and check that it is receivable only at 25 Mc/s on scale.

13 m Band.—Switch set to 13 m, tune to 21.8 Mc/s on scale, feed in a 21.8 Mc/s signal, and adjust core of **L21** (I5). Tune to 21.0 Mc/s on scale, feed in a 21.0 Mc/s signal, and adjust core of **L4** (I4). Feed in a 21.8 Mc/s signal and check that its image is present at 20.9 Mc/s on scale. Finally, feed in a 20.4 Mc/s signal and check that it is receivable only at 20.4 Mc/s on scale.

16 m Band.—Switch set to 16 m, tune to 18.6 Mc/s on scale, feed in an 18.6 Mc/s signal, and adjust core of **L23** (I5). Tune to 18 Mc/s on scale, feed in an 18 Mc/s signal, and adjust core of **L6** (I4). Feed in an 18.6 Mc/s signal and check that its image is present at 17.7



Plan view of the chassis. The band-spread tuning sections **C34, C35** of the gang are interleaved with the larger sections.



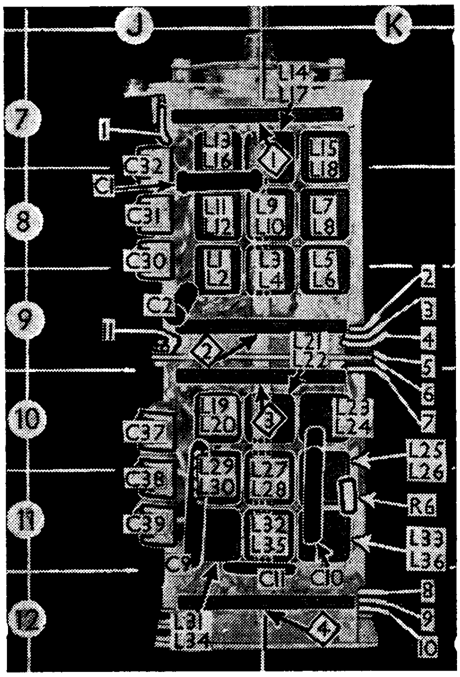
Under-chassis view. The tuning assembly on the right is seen, as it appears when removed and turned over, in the photograph at the foot of col. 4 below, where the waveband switch units are indicated. The A and E sockets are seen inside the assembly, although actually they are not mounted on it. The eighteen core adjustments can be reached through an opening in the base of the cabinet.

Mc/s on scale. Finally, feed in a 17.4 Mc/s signal and check that it is receivable only at 17.4 Mc/s on scale.

19 m Band.—Switch set to 19 m, tune to 15.6 Mc/s on scale, feed in a 15.6 Mc/s signal, and adjust core of **L25** (I5). Tune to 15 Mc/s on scale, feed in a 15 Mc/s signal, and adjust core of **L8** (I4). Feed in a 15.6 Mc/s signal and check that its image is present at 14.7 Mc/s on scale. Finally, feed in a 14.6 Mc/s signal and check that it is receivable only at 14.6 Mc/s on scale.

25 m Band.—Switch set to 25 m, tune to 12.2 Mc/s on scale, feed in a 12.2 Mc/s signal, and adjust core of **L27** (I5). Tune to 11.6 Mc/s on scale, feed in a 11.6 Mc/s signal, and adjust core of **L10** (I4). Feed in a 12.2 Mc/s signal, and check that its image is present at 11.3 Mc/s on scale. Finally, feed in an 11.1 Mc/s signal and check that it is receivable only at 11.1 Mc/s on scale.

31 m Band.—Switch set to 31 m, tune to 10.2 Mc/s on scale, feed in a 10.2 Mc/s signal, and adjust core of **L29** (I5). Tune to 9.7 Mc/s on scale, feed in a 9.7 Mc/s signal, and adjust core of **L12** (I4). Feed in a 10.2 Mc/s signal and check that its image is present at 9.3 Mc/s on scale. Finally, feed in a 9.5 Mc/s signal and check that it is receivable only at 9.5 Mc/s on scale.



Plan view of the tuning assembly, after removal.

DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (two recessed grub screws, each); from the underside of the cabinet remove the four cheese-head screws (with metal washers) and slide out the chassis and speaker as a single unit, lifting the rear member slightly to avoid fouling the tuning scale on the top of the cabinet.

Removing Tuning Assembly.—Switch set to 11m, unclip the waveband indicator from its operating cord, and detach the cord from the tension spring; remove the two round-head screws (with lock washers) from the chassis deck behind the gang capacitor, and the two counter-sunk-head screws from the front of the chassis deck below the gang drive drum;

Unsolder the eleven leads and earth braid from the tuning assembly at points indicated in our picture of the assembly by the numbers one to eleven;

Lift the assembly, rear end first, from the chassis.

When replacing, the eleven leads and earth braid should be resoldered to the eleven tags numbered in our picture of the tuning assembly, as follows: Brown from **A** socket to **1**; red plastic covered lead from **C12, R4** to **2**; green from **C33** to **3**; blue from **C34** to **4**; end of **C13** to **5**; yellow/green lead from **C36** to **6**; end of **C8** and red lead from **C35** to **7**; orange plastic covered lead from P.U. socket to **8**; red screened lead from **R9** to **9**; black screened lead from **C18** to **10**; earth braid from chassis to **11.**

GENERAL NOTES

Tuning Assembly.—All the R.F. and oscillator coils, with their switches, trimmers and other components intimately associated with them (with the exception of the tuning gang) are contained in a single unit beneath the chassis, indicated in our under-chassis view.

The eighteen core adjustments are symmetrically arranged on the base-plate, and when a cover is removed from the underside of the cabinet they are immediately accessible. The six pre-set capacitor trimmers face the end of the cabinet, and cannot be adjusted without removing the chassis.

The whole assembly can be removed for inspection as a single unit upon disconnection of the leads to eleven tags which are indicated in our circuit diagram by solid circles, with arrows to indicate the connecting leads. An illustration of the unit after removal, standing on its base, is shown in col. 4, where the tags are numbered to correspond with the numbers in the circuit diagram.

Switches.—The waveband and band-spread selector switches **S1-S60** and the radio/gram change-over switches **S61, S62** are ganged in a 4-unit 10-position switch assembly mounted in the tuning assembly. They are indicated in our photograph of the assembly in col. 4 by numbers in diamonds, and shown in detail in the diagrams in col. 1, where they are viewed in the directions of the arrow in the photograph.

The table beside the diagrams gives the switch positions for the ten control settings, starting from the fully anti-clockwise position of the control knob. A dash indicates **open,** and **C,** closed.

S63 is the Q.M.B. mains switch, ganged with the tone control **R17.**

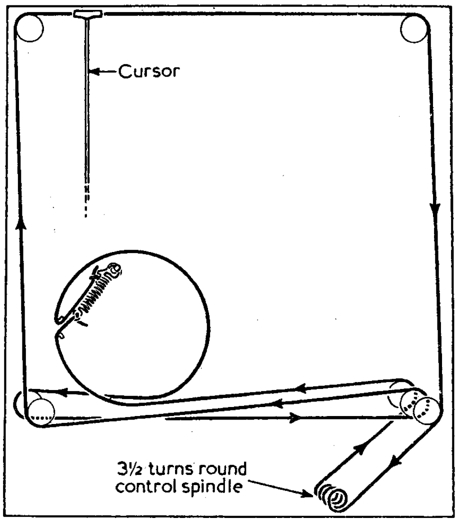
Scale Lamps—These are four Osram **M.E.S.** types, with small clear spherical bulbs, rated at 3.5 V, 0.3 A. They are series-parallel connected across the heater winding of **T2, their** centre junction **being earthed.**

External Speaker.—Three sockets are provided on a panel at the rear of the **chassis.** The two outers are for the connection **of a** low impedance (3-5 Ω) external speaker. The centre socket normally accommodates the muting plug, which may be withdrawn to mute the internal speaker.

DRIVE CORD REPLACEMENT

Seventy-five inches of Nylon braided glass cord is required for the tuning drive, this length leaving sufficient for tying off. Knots should be coated with some acetate solution to prevent them from slipping.

The sketch below shows the course to be followed, arrows indicating the recommended direction of running it on. The sketch is drawn as seen from the rear of the chassis, with the gang at maximum, except that the control spindle section is normally hidden from view by the chassis deck.



Sketch showing the drive cord system.

Printed in England by The Cornwall Press Ltd., Paris Garden, London, S.E.1.

*